

What is claimed is:

- Sub 1
1. A modular patient care system having a plurality of units, said plurality of units comprising:
- 5 an interface unit for providing a user interface to said system and for providing electrical power to said system; and a functional unit capable of removable connection to said interface unit, said functional unit being capable of providing patient therapies or monitoring, said functional
- 10 unit comprising a first lead, means for providing a first signal when connected to an adjacent unit, and a load coupled to said first lead for receiving electrical power therefrom; wherein said interface unit comprises:
- a power source for receiving electrical power from
- 15 a power supply and providing electrical power to said patient care system;
- a power lead for electrically contacting said first lead, said power lead having an active state when electrically coupled to said power source, said power
- 20 lead having an inactive state when electrically isolated from said power source;
- detecting means for detecting said first signal;
- coupling means for electrically coupling said power lead to said power source responsive to the presence of
- 25 said first signal;
- wherein said power lead is in the active state when said functional unit is connected to said interface unit for supplying electrical power to said functional unit, and wherein said power lead is in the inactive state when said
- 30 functional unit is not connected to said interface unit.
2. A modular patient care system, comprising:
- an interface unit for providing a user interface to said system and for providing electrical power to said system,
- 35 said interface unit comprising a power lead; and a plurality of functional units for providing patient therapies or monitoring, said plurality of functional units

including a first functional unit and a second functional unit, said first functional unit being capable of removable connection to said interface unit, said second functional unit being capable of removable connection to said first functional unit and having a first lead, said second functional unit further comprising means for providing a first signal to said first functional unit when connected thereto and a load coupled to said first lead for receiving electrical power therefrom;

- 10 wherein said first functional unit further comprises:
a first lead configured and dimensioned to contact said power lead of said interface unit when said first functional unit is connected to said interface unit;
a second lead for electrically contacting said
15 first lead of said second functional unit;
a load coupled to said first lead for receiving electrical power therefrom;
detecting means for detecting said first signal
from said second functional unit;
20 means for permitting an electrical coupling of said second lead to said first lead of said first functional unit responsive to said first signal from said second functional unit and for electrically isolating said second lead from said first lead of said first
25 functional unit in the absence of said first signal from said second functional unit;
whereby said second lead is permitted to be electrically coupled to said power lead of said interface unit when said second functional unit is connected to said first functional
30 unit, and electrically isolated from said power lead when said second functional unit is disconnected from said first functional unit.

3. The modular patient care system of claim 1, said
35 interface unit having an originating side and a terminating side, further comprising an array of functional units each having an originating side and a terminating side, wherein

the originating side of any unit is capable of connection to the terminating side of any other unit,

whereby a linear array of units having an originating end and a terminating end is capable of being formed.

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4. The modular patient care system of claim 3, wherein said first signal is an originating side sense signal for indicating the presence of said functional unit to a unit adjacent said originating side in the linear array;

10 wherein said first lead of said functional unit is an originating side lead,

wherein said power lead is a terminating side power lead for contacting an originating side lead of a functional unit adjacent said terminating side of said interface unit,

15 and

wherein said detecting means is a terminating side detecting means for detecting an originating side sense signal from the functional unit in the linear array adjacent said terminating side of the interface unit,

20 whereby when said functional unit is connected adjacent to the terminating side of said interface unit, said terminating side power lead is in the active state, and

whereby said terminating side power lead is inactive when no functional unit is connected adjacent to the

25 terminating side of said interface unit.

5. The modular patient care system of claim 4, said functional unit further comprising a terminating side lead, said lead also being coupled to said terminating side lead

30 and being capable of receiving electrical power therefrom, said functional unit further comprising a means for providing a terminating side sense signal to a unit adjacent said terminating side when connected thereto, said interface unit further comprising:

35 an originating side power lead for contacting a terminating side lead of a functional unit adjacent said originating side;

an originating side detect means for detecting a terminating side sense signal from a functional unit adjacent said originating side; and

an originating side coupling means for electrically
5 coupling said originating side power lead to said power source responsive to the presence of said terminating side sense signal;

whereby when said functional unit is connected to the originating side of said interface unit, said originating
10 side power lead is electrically coupled to said power source, and

whereby said originating side power lead is electrically isolated when no functional unit is connected to the originating side of said interface unit.

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6. The modular patient care system of claim 5, said interface unit further comprising:

an originating side sense signal providing means for providing an originating side sense signal to a
20 functional unit adjacent said originating side; and

a terminating side sense signal providing means for providing a terminating side sense signal to a functional unit adjacent said terminating side.

25 7. The modular patient care system of claim 4, said terminating side detection means comprising a lead designed and configured to contact said originating side sense signal providing means of said functional unit adjacent said terminating side upon attachment.

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8. The modular patient care system of claim 7, said terminating side coupling means comprising a transistor having a first terminal coupled to said power source, a second terminal coupled to said terminating side power lead,
35 and a third terminal coupled to said terminating side detection means lead.

9. The modular patient care system of claim 8, said transistor being a MOSFET, said first terminal being the source of said MOSFET, said second terminal being the drain of said MOSFET, and said third terminal being the gate of
5 said MOSFET.

10. The modular patient care system of claim 8, said functional unit further comprising a terminating side lead, said load also coupled to said terminating side lead and
10 being capable of receiving electrical power therefrom, said functional unit further comprising a means for providing a terminating side sense signal to a unit adjacent said terminating side when connected thereto, said interface unit further comprising:

15 an originating side power lead for contacting a terminating side lead of a functional unit adjacent said originating side;

an originating side detecting means for detecting a terminating side sense signal from the functional unit adjacent said originating side; and
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originating side coupling means for electrically coupling said originating side power lead to said power source responsive to the presence of said terminating side sense signal;

25 whereby when said functional unit is connected to the originating side of said interface unit, said originating side power lead is electrically coupled to said power source, and

whereby said originating side power lead is electrically
30 isolated when no functional unit is connected to the originating side of said interface unit.

11. The modular patient care system of claim 10, said originating side detection means comprising a lead designed
35 and configured to contact the terminating side sense signal providing means of the functional unit adjacent said

originating side upon attachment of the functional unit to the originating side of said interface unit.

12. The modular patient care system of claim 11, said
5 originating side coupling means comprising a transistor having a first terminal coupled to said power source, a second terminal coupled to said originating side power lead, and a third terminal coupled to said originating side detection means lead.

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13. The modular patient care system of claim 6, said originating side and terminating side sense signals being ground signals.

15 14. A modular patient care system having a plurality of units including an interface unit for providing a user interface to said system and for providing electrical power to said system, said plurality of units also including a plurality of functional units for providing patient therapies
20 or monitoring, said interface unit comprising:

a left side, a left lead coupled to said left side, and a left signal providing means at said left side;

a right side, a right lead coupled to said right side, and a right signal providing means at said right
25 side;

a power source;

means for coupling said left lead to said power source responsive to a right signal from an attached adjacent left functional unit; and

30 means for coupling said right lead to said power source responsive to a left signal from an attached adjacent right functional unit;

wherein each functional unit comprises:

a left side and a right side, said left side being
35 capable of coupling to the right side of any other unit, whereby said interface unit and functional units are

capable of being arranged in a linear array of units having a leftmost unit and a rightmost unit;

a left lead at left side and a right lead at said right side, said left lead for coupling to the right lead of an adjacent left unit, said right lead for coupling to the left lead of an adjacent right unit;

a load coupled to said left lead through a left one-way power means and capable of receiving electrical power therefrom, said load also being coupled to said right lead through a right one-way power means and capable of receiving electrical power therefrom;

a left signal providing means for providing a left signal to an adjacent left unit;

a right signal providing means for providing a right signal to an adjacent right unit;

a left detecting means for detecting the right signal of an adjacent left unit;

a right detecting means for detecting the left signal of an adjacent right unit; and

means for coupling said left lead to said right lead responsive to the presence of the combination of a left signal from a right adjacent unit and a right signal from a left adjacent unit in the linear array; whereby said loads of each functional unit in the linear

array are electrically coupled to said power source,

whereby said left lead of said leftmost unit of said linear array is electrically isolated from said power source, and

whereby said right lead of said rightmost unit is electrically isolated from said power source.

15. The modular patient care system of claim 14, said left detection means comprising a lead configured and dimensioned to connect to a right signal providing means of an adjacent left unit when connected, said right detection means comprising a lead configured and dimensioned to connect

to a left signal providing means of an adjacent right unit when connected.

16. The modular patient care system of claim 15, said
5 means for coupling said left lead to said right lead comprising:

a left transistor having a first terminal coupled to said left lead, a second terminal, and a third terminal coupled to said right detection means;

10 a right transistor having a first terminal coupled to said right lead, a second terminal coupled to said second terminal of said left transistor, and a third terminal coupled to said left detection means.

15 17. The modular patient care system of claim 15, wherein said left one-way power means comprises a first diode connected between said left lead and an input of said load, and wherein said right one-way power means comprised a second diode connected between said right lead and said input of
20 said load.

18. The modular patient care system of claim 16, wherein said left and right transistors are MOSFETs, the third terminal of said left MOSFET transistor being its gate
25 terminal, the third terminal of said right MOSFET transistor being its gate terminal.

Sub 19
19. A modular patient care system, comprising:
a plurality of modules including a first module and a
30 second module, said second module comprising a first portion grippable by a user, said second module being configured and dimensioned so as to be capable of being held by a single hand of the user by gripping said first portion;
a hinge connector pair configured and dimensioned to
35 allow hingeable engagement of said second module to said first module near a first end of said second module;

a latch mechanism for securing said second module to said first module near a second end of said second module, said latch mechanism comprising a first part connected to said first module and a second part connected to said second
5 module near said second end, said second part being capable of springably securing to said first part when forced into said first part;

means for releasing said second part from said first part;

10 a guide mechanism separate from said hinge connector pair and said latch mechanism and located therebetween, said guide mechanism for discouraging off-axis engagement of said first and second modules and for providing mechanical stability for said first and second modules when engaged;

15 wherein

said means for releasing is located sufficiently distal from said first portion of said second module such that a second hand is required to actuate said releasing means when the first hand of the user is gripping said first portion;

20 whereby

said second module is capable of being structurally engaged to said first module in a one-handed, single step operation, and whereby an at least two-step or two-handed operation is required to structurally disengage said second

25 module from said first module.

30 20. The modular patient care system of claim 19, said latch mechanism further comprising a latch tongue on one of said first or second parts and a catch feature on the other of said first or second parts for catching and engaging said latch tongue, wherein said releasing means is configured and dimensioned to release said latch tongue from said catch feature upon actuation.

35 21. The modular patient care system of claim 19, said hinge connector pair comprising:

a male hinge connector on either of said first or second modules, said male hinge connector having a first and second set of electrical contacts formed thereon; and

a female hinge connector on the other of said first or 5 second modules for hingeably engaging said male hinge connector, said female hinge connector having a third and fourth set of electrical contacts formed thereon configured and dimensioned to connect to said first and second set of electrical contacts, respectively, upon hingeable engagement 10 of said hinge connector pair;

whereby said first and second modules become electrically engaged upon becoming structurally engaged.

4 22. The modular patient care system of claim 21, wherein 3
15 said electrical contacts are configured and dimensioned such that said first and third sets of electrical contacts connect before said second and fourth sets of electrical contacts connect during engagement of said first and second modules, and such that said first and third sets of electrical 20 contacts disconnect after said second and fourth sets of electrical contacts disconnect during disengagement of said first and second modules.

5 23. The modular patient care system of claim 20, further 2
25 comprising a fastener for affixing said latch tongue within said catch feature, said fastener being configured and dimensioned such that a special fastener tool is required to release said fastener from said latch tongue,

whereby when said fastener has affixed said latch 30 tongue, said first and second modules remain permanently engaged until said fastener is released from said latch tongue using said special fastener tool.

6 24. The modular patient care system of claim 19, said 1
35 modules each having a front, a back, and sides, said first and second modules defining a pair when engaged, said guide mechanism comprising:

a male elevation feature protruding from one of said first or second modules;

a female recess feature in the other of said first or second modules;

5 wherein said male elevation feature is chamfered and said female recess feature is shaped for corresponding lead-in to provide guidance of said modules during engagement.

7 25 The modular patient care system of claim 20, said latch
10 tongue and said catch feature being configured and dimensioned to provide for springable engagement of said latch tongue into said catch feature sufficient to cause a mechanical resonance at said first portion detectable by the user, whereby tactile feedback is provided to the user upon
15 completion of the engagement of said first and second modules.

8 26. The modular patient care system at claim 21, said first
20 and second modules defining a pair when engaged, said modular patient care system further comprising a cover coupled to said male or female hinge connectors for covering said connector when not in use, said cover being hingeably adjustable with respect to said connector, wherein said cover is configured and dimensioned to be partially compressed upon
25 engagement of said first and second modules to provide cushion and prevent rattling of said pair.

9 27. The modular patient care system of claim 21, said first
30 module being a main interface module for providing an interface between the system and the user, said second module being a functional module for providing patient therapies or monitoring, said first and second modules each comprising a face, a first surface, and a second surface opposite said first surface,

35 wherein said hinge connector pair, said latch mechanism, and said guide means are formed at said second surface of

said first module and said first surface of said second module, and

wherein said second surface of said second module is substantially identical to said first surface of said first
5 module;

whereby said first and second modules are capable of being electrically and structurally engaged by hingeably coupling said first surface of said second module to said second surface of said first module, and

10 whereby said first and second modules are also capable of being electrically and structurally engaged by hingeably coupling said second surface of said second module to said first surface of said first module.

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